provoke much discussion; facts are marshalled in an imposing array to support it, and theoretical synoptic charts are produced which are wonderfully similar to the charts based upon actual observations. The pressure-waves are apparently not sound-waves; they are described as "true pressure-waves traversing the upper atmosphere in the same way that water-waves travel across the sea"—*i.e.* they are waves formed at a surface of discontinuity. As the waves appear to be at least 500 miles from crest to trough, there cannot be very many of them—probably, in fact, not more than one—in existence at a time, so that the comparison ought to be with one long wave in shallow water (*e.g.* a tidal wave) rather than with "water-waves travelling across the sea"; it appears doubtful if it is possible at the surfaces of discontinuity, which certainly exist in the Antarctic, to get waves 500 miles long travelling at forty miles per hour, and having pressure amplitudes of 20 millibars at sea-level. The horizontal transference of a large mass of air naturally suggests itself as an alternative explanation, but the adjustment of the motion to the pressure gradient presents difficulties.

In his discussion of the general circulation Dr. Simpson arrives at conclusions agreeing in some respects with Hobbs, and in others with Meinardus. Broadly speaking, he makes the whole continent an anticyclonic area surrounded by a broad band of low pressure about lat. 65; but at 10,000 ft. the plateau alone is anticyclonic, while a very marked cyclone is centred over the part of the Antarctic which is near sea-level. The upper winds deduced from cloud observations and from Erebus's smoke fit in well with the scheme.

The free atmosphere over the Antarctic had never been explored before Dr. Simpson sent up his *ballons-sondes*; the results of this first attempt are remarkably good, although the stratosphere was not reached. Out of twenty-one ascents, fourteen instruments were recovered, of which twelve furnished good records; but three of them referred to different times on one day, November 19, 1911. In six cases of summer ascents the temperature decreased steadily upwards at a rate of about 6° C. per kilometre; in four cases of winter ascents temperature rose at the commencement of the ascent, and began to fall only after a height of one or two kilometres had been reached. The lowest temperature recorded in these ascents was −46° C. (−51° F.) at a height of 6750 m. (22,000 ft.) on Christmas Day, 1911. The lowest temperature recorded on the Barrier was −60° C. (−76° F.) on July 6, and this is the lowest temperature recorded anywhere in the Antarctic.

The observations on atmospheric electricity led to interesting conclusions on the effect of drift-snow, which, however, could not be put to the crucial test owing to Dr. Simpson's unexpected recall to India. One is, indeed, forced to observe that the Government of India was decidedly less than generous throughout. It might well have lent Dr. Simpson's services in such a glorious cause, seeing that a proper knowledge of Antarctic meteorology is vital to an understanding of those great currents of the atmosphere to which monsoons belong; instead, it granted him "leave without pay," and then recalled him in the middle of the enterprise.

The work is a notable contribution, not merely to Antarctic meteorology, but also to meteorological science; it is an enduring monument to the great leader of the expedition through whose foresight and scientific spirit the enterprise was made possible.

Imperial Mineral Resources.

(1) *Imperial Mineral Resources Bureau. The Mineral Industry of the British Empire and Foreign Countries. War Period. Arsenic.* Price 6*d.* net. *Felspar.* Price 6*d.* net. *Chrome Ore and Chromium.* Price 1*s.* net. *Fuller's Earth.* Price 6*d.* net. *Magnesite.* Price 1*s.* 3*d.* net. (London: H.M. Stationery Office.)

(2) *Tungsten Ores.* By R. H. Rastall and W. H. Wilcockson. (Imperial Institute: Monographs on Mineral Resources, with Special Reference to the British Empire.) Pp. ix+81. (London: John Murray, 1920.) Price 3*s.* 6*d.* net.

(1) THE necessity for complete and accurate information about the mineral resources of the British Empire has repeatedly been emphasised in these columns and elsewhere. Even before the war this need had become evident, and it was felt to be a serious reflection upon British statisticians that the most trustworthy source of such information was to be found in an American publication. During the war, the gravity of this deficiency naturally became accentuated, and the formation of the Imperial Mineral Resources Bureau has been the result. This bureau has now been organised, and is entering seriously upon its labours, the result being made public in the form of a succession of pamphlets, each dealing with one particular mineral. Those hitherto issued relate to minerals of relatively minor importance, and include arsenic, felspar, chrome ore and chromium, fuller's earth and magnesite. The

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scheme of all these pamphlets is identical; they commence with a general description of the mineral discussed, its composition, uses, and chief sources of supply. The world's output of the mineral is then given, and this is followed by a detailed description of the occurrences in the United Kingdom and the rest of the British Empire, together with statistics of production, followed by similar information concerning foreign producers. References to technical literature on the subject are given in an appendix, and in some cases there is an additional note on some important application of the mineral; for instance, the pamphlet on magnesite contains a note on the production of magnesium chloride and its use in the manufacture of Sorel cement. It should be added that the statistics and information relate in each case to the "war period," 1913-1919. These publications thus form a continuation of those formerly issued by the Home Office, and known as part iv. of the Report of the Chief Inspector of Mines. It would probably have been more convenient for most users of these pamphlets if the statistics had been taken rather further back, and given, say, for the last ten years, and if decennial tables were included in all future annual issues. There is some information as to costs and prices, though not sufficient for those interested in the industries, but no doubt in future years these figures will be given in more detail; it is also stated that in future issues data concerning labour, safety, etc., will be included.

The work of compilation has been well and carefully done, upon the whole; it would be easy to point out small errors and omissions, but these are inevitable in the first issue of a publication of this kind, which involves a vast amount of minute and painstaking research amongst a large number of different sources of information, which are often of very unequal value so far as trustworthiness is concerned. Perhaps the least satisfactory feature is the fact that a number of different standards of weight are employed; it is true that a footnote points out that metric, long and short tons are employed, and the equivalent of each of these is given, but this is not quite enough; it should not be necessary for anyone using these pamphlets to make a calculation before he can compare the statistics that he finds on adjoining pages; probably the best plan is to give in every case the tonnages as reported in the original source of information, and in a parallel column these weights in metric tons, which latter are being largely employed by scientific statisticians.

(2) Simultaneously with the issue of these publications by the Imperial Mineral Resources Bureau, the Imperial Institute has issued another volume of its series of monographs on mineral resources, the present one being on tungsten ores, written by Messrs. R. H. Rastall and W. H. Wilcockson. In its general scheme this pamphlet is identical with those produced by the Imperial Mineral Resources Bureau, and its execution is quite satisfactory, though perhaps the economic aspect of the subject receives even less attention here than in the other series of publications. The question that evidently obtrudes itself, however, is whether there is anything at all gained by this duplication of effort. The issue seems to be unusually simple; the Imperial Mineral Resources Bureau has been organised, and is maintained out of public funds for doing just the very work that the Imperial Institute is taking up. If the bureau does not do its work completely and efficiently, it should be called upon to mend its ways; but if it does do the work entrusted to it satisfactorily, it is surely to the public interest that the Imperial Institute should employ the funds entrusted to it in some more useful manner than in duplicating this work, and it cannot be suggested that there are not plenty of other important Imperial problems needing investigation.

H. LOUIS.

New World Zoology.

Zoölogy: A Text-book for Colleges and Universities. By Prof. T. D. A. Cockerell. (New World Science Series.) Pp. xi + 558. (Yonkers-on-Hudson, New York: World Book Co., 1920.) Price 3 dollars.

TEXT-BOOKS of zoology are legion, and they are by no means all bad. Some of them, indeed, like "Marshall and Hurst," are almost perfect specimens of their kind. Yet we can understand the growth of the list, for every experienced professor of the science has his optimistic moments when he thinks that his particular way of teaching the subject is worthy of presentation to an audience wider than that in his classroom. But the unfortunate fact seems to be that few writers of text-books have managed to fulfil their intention. In many cases the individuality ends with the preface, the whole book sinking to conventional competence on familiar lines.

But this is not true of Prof. Cockerell's "Zoölogy," for it has an individuality. "The biology or zoology for the average individual who has no thought of specializing in the department should not be too morphological, too rich in detailed facts of structure and classification. Experience shows that such minutiæ are not remembered, and do not necessarily leave as a residue any broad and useful conceptions." So the author

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